IN THE CLAIMS:

Please cancel claims 1-30, without prejudice, and add new claims 31-72 as follows.

Claims 1-30. (Cancelled).

31. (New) A method of transmitting complex symbols using a transmission code matrix, said method comprising:

- constructing said transmission code matrix, wherein each of said complex symbols forms part of at least two elements of said transmission code matrix and wherein at least some of said matrix elements are formed by linearly mixing at least two of said complex symbols; and

- transmitting said transmission code matrix, at least partially in parallel, using substantially orthogonal signalling resources and at least three different transmit antenna paths.

32. (New) The method of Claim 31, wherein constructing said transmission code matrix comprises:

- converting a stream of complex symbols to at least two at least partially different streams of complex symbols;

- modulating said at least two streams of complex symbols to form at least two code matrices, at least one of which is of dimension greater than one;

- transforming said code matrices using linear transformations, to construct at least two transformed transmit diversity code matrices; and

- constructing a transmission code matrix using at least two transformed transmit diversity code matrices.

33. (New) The method of Claim 32, wherein at least one of the linear transformations is different from an identity transformation.

34. (New) The method of Claim 32, wherein the at least two code matrices are orthogonal code matrices.

35. (New) The method of Claim 32, wherein both the matrix dimensions of the transmission code matrix are greater than the corresponding matrix dimensions of the transformed transmit diversity code matrices.

36. (New) The method of Claim 35, wherein the transmission code matrix is constructed from the transformed transmit diversity code matrices using the method of embedding a lower-dimensional matrix into a higher-dimensional one.

37. (New) The method of Claim 32, wherein the transmission code matrix is constructed from the transformed transmit diversity code matrices using at least one of the methods of repetition, negation, conjugation, permutation, multiplying with a matrix.

38. (New) The method of Claim 32, wherein the first transformed code matrix is constructed by summing two code matrices, and the at least the second transformed code matrix is constructed by subtracting the said two code matrices.

39. (New) The method in Claim 34, wherein the symbol rate of the transmission matrix is the same as the average symbol rate of the orthogonal code matrices to which the linear transformations are applied.

40. (New) The method of Claim 31, wherein the transmission code matrix extends over T substantially orthogonal signaling resources, and wherein more than T complex symbols are used to construct the transmission code matrix.

41. (New) The method of Claim 32, wherein the step of constructing the at least two streams of complex symbols contains a serial-to-parallel conversion.

42. (New) The method of Claim 32, wherein the step of constructing the at least two streams of complex symbols contains a rotation unit.

43. (New) The method of Claim 42, wherein the rotation unit is a symbol rotation matrix that differs from an identity matrix, and contains at least two zero-elements.

44. (New) The method of Claim 42, wherein the rotation unit is a symbol rotation matrix that is formed as Kroneker product of two unitary matrices, where at least one is different from an identity matrix.

45. (New) The method of Claim 43, wherein the symbol rotation matrix is a diagonal matrix, where at least one diagonal element is a complex number.

46. (New) The method of Claim 40, wherein at least two transformed transmit diversity code matrices are transmitted in parallel, and wherein the two transformed transmit diversity code matrices contain at least partially different symbols.

47. (New) The method of Claim 40, wherein a part of the symbols are transmitted on a block-diagonal sub-matrix within the transmission code matrix, and at least partly different symbols are transmitted on an anti-block-diagonal sub-matrix within the transmission code matrix.

48. (New) The method of Claim 40, wherein there are four substreams and wherein each substream is modulated to form an orthogonal 2 x 2 code matrix incorporating two complex symbols, and wherein the transmission code matrix extends over at least four substantially orthogonal signaling resources.

49. (New) The method of Claim 32 wherein at least one code matrix has a different symbol rate than another code matrix.

50. (New) The method of Claim 32, wherein at least one code matrix has different dimensions than another code matrix.

51. (New) The method of Claim 32, wherein at least one code matrix is transmitted with different power than another code matrix.

52. (New) The method of Claim 32, wherein the substantially orthogonal signaling resources include at least one of the following: non-overlapping time slots, different spreading codes, different OFDM subcarriers, different wavelet waveforms and different FDMA channels.

53. (New) An apparatus for transmitting complex symbols using a transmission code matrix, said apparatus comprising:

- components which are adapted to construct a transmission code matrix out of complex symbols, wherein each of said complex symbols forms part of at least two elements of said transmission code matrix and wherein at least some of said matrix elements are formed by linearly mixing at least two of said complex symbols; and

- transmission means adapted to transmit said transmission code matrix, at least partially in parallel, using substantially orthogonal signalling resources and at least three different transmit antenna paths.

54. (New) The apparatus of Claim 53, wherein said components adapted to construct a transmission code matrix comprise:

- conversion means for converting a stream of complex symbols to at least two at least partially different streams of complex symbols;

- modulating means for modulating said at least two streams of complex symbols to form at least two code matrices, at least one of which is of dimension greater than one;

- transforming means for transforming said code matrices using linear transformations, to construct at least two transformed transmit diversity code matrices; and

- code constructing means for constructing a transmission code matrix using at least two transformed transmit diversity code matrices.

55. (New) The apparatus of Claim 54, wherein the transforming means applies at least one linear transformation different from an identity transformation

56. (New) The apparatus of Claim 54, wherein the modulating means forms orthogonal code matrices.

57. (New) A system comprising a transmitter for transmitting complex symbols using a transmission code matrix, and a receiver for receiving transmitted complex symbols, said transmitter comprising:

- components which are adapted to construct a transmission code matrix out of complex symbols, wherein each of said complex symbols forms part of at least two elements of said transmission code matrix and wherein at least some of said matrix elements are formed by linearly mixing at least two of said complex symbols; and

- transmission means adapted to transmit said transmission code matrix, at least partially in parallel, using substantially orthogonal signalling resources and at least three different transmit antenna paths.

58. (New) A transmission code matrix, which is to be transmitted at least partially in parallel on at least three different transmit antenna paths using substantially orthogonal signalling resources, said transmission code matrix being constructed based on complex symbols which are to be transmitted, wherein each of said complex symbols forms part of at least two elements of said transmission code matrix and wherein at least some elements of said transmission code matrix comprise a linear mixture of at least two of said complex symbols.

59. (New) The transmission code matrix of claim 58, wherein said complex symbols are four complex symbols and wherein said transmission code matrix comprises 4x4 elements.

60. (New) The transmission code matrix of claim 58, wherein said complex symbols comprise a first group of four complex symbols and a second group of four complex signals, wherein said transmission code matrix comprises 4x4 elements, and wherein said complex symbols are linearly mixed within a respective group in said transmission code matrix.

61. (New) A method for receiving a signal comprising:

- estimating the impulse response estimates from each transmit antenna path to each receive antenna,

- calculating bit or symbol estimates for transmitted signal stream or streams using the structure of a transmission matrix, said matrix comprising at least one linear combination of two orthogonal space-time code matrices or channel symbols, and said channel impulse response estimates.

62. (New) The method of Claim 61, wherein the bit or symbol estimates are hard decisions corresponding to the symbol alphabet used in the modulator.

63. (New) The method of Claim 61, wherein the bit or symbol decisions are soft decisions that reflect the reliability of the decision.

64. (New) The method of Claim 63, wherein the reliability is derived from bit or symbol a-posteriori probabilities.

65. (New) The method of Claim 61, wherein the transmitted bits or symbols streams are channel coded, and the detector performs joint detection and decoding over transmission code matrix and the channel code decoder.

66. (New) The method of Claim 65, wherein the joint detection and decoding method uses reliability estimates calculated for transmitted symbols or bits.

67. (New) An apparatus for receiving a signal comprising:

- a channel estimation module that outputs estimates of the impulse response estimates from each transmit antenna path to each receive antenna; and

- a detection module that uses the structure of a transmission matrix, said matrix comprising at least one linear combination of two orthogonal space-time code matrices or channel symbols, and channel impulse response estimates to calculate bit or symbol estimates for transmitted signal stream or streams.

68. (New) The apparatus of Claim 67, wherein the bit or symbol estimates are hard decisions corresponding to the symbol alphabet used in the modulator.

69. (New) The apparatus of Claim 67, wherein the bit or symbol decisions are soft decisions that reflect the reliability of the decision.

70. (New) The apparatus of Claim 69, wherein the reliability is derived from bit or symbol a-posteriori probabilities.

71. (New) The apparatus of Claim 67, wherein the transmitted bits or symbols streams are channel coded, and the detector performs joint detection and decoding over transmission code matrix and the channel code decoder.

72. (New) The apparatus of Claim 71, wherein the joint detection and decoding method uses reliability estimates calculated for transmitted symbols or bits.